THE NATIONAL PHYSICAL LABORATORY.

THE realisation of the scheme for the establishment of a National Physical Laboratory is primarily due to two addresses delivered before the British Association in 1891 and 1895 by Prof. Oliver Lodge and the late Sir Douglas Galton respectively. The fact that Sir Douglas Galton, when president of the Association, did all in his power to support the proposal originally made by Prof. Lodge, led to the matter being laid before the Prime Minister by a strong deputation. A committee, of which Lord Rayleigh was chairman, was then appointed by the Treasury, and after taking evidence, reported in favour of the establishment of a public institution for standardising and verifying instruments, for testing materials, and for the determination of physical constants. They further recommended that the institution should be established by extending the Kew Observatory in the Old Deer Park, Richmond, and that the Royal Society should be invited to control it and to nominate a governing body, on which commercial interests should be represented, the choice of the members of such body not being confined to Fellows of the Society.

These recommendations were approved, and to give effect to them the Government undertook to ask Parliament for 12,000*l.* for buildings and for 4000*l.* a year. A scheme for the management of the new institution has been approved by the Treasury, and the first instalment of the promised grants has been sanctioned by the Legislature. The Kew Observatory Committee are willing that the Institution which they have managed very successfully should be merged in the National Physical Laboratory, which will thus become possessed of an endowment of 458*l.* per annum from the Gassiot Trust, and of an income of about 2700*l.* from fees for standardising. These receipts have, in the past, rather more than covered the expenses of carrying on the work of the Observatory.

The ultimate control of the National Physical Laboratory is placed in the hands of the Royal Society, but the constitution of the bodies which manage it directly can only be altered with the consent of the Treasury. These are an Executive Committee and a General Board. The latter is a relatively large body, to which the Executive Committee must report annually, and to which it must submit its scheme of work for the next year. An essential feature in the constitution of the General Board is that twelve of its members are nominated by six of the great technical societies—viz. the Institutions of Civil, Mechanical, Electrical and Naval Engineers, the Iron and Steel Institute, and the Society of Chemical Industry. Six of these representatives of "commercial interests" are also to be members of the Executive Committee, which will ultimately consist of twelve ordinary and five official members, of whom the latter are: the President of the Royal Society, the Chairman of the Committee, the Permanent Secretary of the Board of Trade, and the Treasurer and one of the Secretaries of the Royal Society. In the first instance, six members of the existing Kew Observatory Committee will also have seats on the Executive Committee, but their places will not be filled up when their period of office expires. Finally, it is in the power of the Executive Committee to appoint sub-committees to superintend particular departments or investigations. The members of these sub-committees need not necessarily be members either of the General Board or of the Executive Committee.

Preliminary arrangements have been in progress for some time in order that the National Physical Laboratory should be organised as soon as possible after the requisite funds were voted by Parliament.

The six technical societies have nominated their representatives, the General Board and Executive Committee have been constituted, and general satisfaction will be felt at the announcement that Lord Rayleigh has accepted the chairmanship of these bodies.

On the recommendation of the Executive Committee, the Council of the Royal Society has appointed Mr. R. T. Glazebrook, F.R.S., now Principal of University College, Liverpool, to the important post of Director of the National Physical Laboratory. A number of sub-committees have also been organised by the Executive Committee, which have been requested to make suggestions preparatory to the drawing up of a detailed scheme of work and of the plans of the new buildings.

The members of the Executive Committee are:—

Lord Lister, P.R.S., Lord Rayleigh (*Chairman*), Mr. A. B. Kempe, Treas. R.S., Prof. A. W. Rücker, Sec. R.S., and Sir Courtenay Boyle (*ex officio*), Captain W. de W. Abney, Sir N. Barnaby, Mr. G. Beilby, Sir E. H. Carbutt, Bart., Captain E. W. Creak, R.N., Prof. R. B. Clifton, Prof. G. C. Foster, Mr. F. Galton, Prof. O. J. Lodge, Sir A. Noble, Prof J. Perry, Sir W. Roberts-Austen, Prof. A. Schuster, Mr. A. Siemens, General Sir R. Strachey, Prof. J. J. Thomson, Dr. T. E. Thorpe, Sir J. Wolfe Barry.

In addition to the above, the following are also members of the General Board:—

Sir M. Foster, Sec. R.S. (*ex officio*), Sir F. A. Abel, Bart., Prof. W. G. Adams, Prof. W. E. Ayrton, Mr. H. Bell, Mr. A. Buchan, Mr. R. E. Crompton, Prof. G. F. Fitzgerald, Prof. J. Joly, Lord Kelvin, Mr. J. T. Milton, Sir W. H Preece, Mr. W. F. Reid, the Earl of Rosse, Dr. R. H. Scott, Mr. W. N. Shaw, Mr. C. E. Stromeyer, Admiral Sir W. Wharton, Sir W. H. White.

The following have also been requested to serve on one or other of the sub-committees above referred to:—

Messrs. E. D. Archibald, C. V. Boys, Prof. H. L. Callendar, Messrs. Forbes Carpenter, W. H. M. Christie, J. H. Dallmeyer, Prof. J. A. Ewing, Mr. S. Z. de Ferrant Prof. J. A. Fleming, Messrs. R. E. Froude, E. H. Griffiths, J. Mansergh, T. Matthews, W. H. Maw, Dr. L. Mond, Hon. C. A. Parsons, Prof. A. W. Reinold, Captain H. R. Sankey, Messrs. J. Swinburne, G. J. Symons, H. A. Taylor, Prof. S. P. Thompson, Messrs. J. I. Thornycroft, C. H. Wordingham and A. F. Yarrow.

It will thus be seen that the National Physical Laboratory is being founded on a wide basis. A definite scheme of work will be arranged during the autumn. The Director will, it is hoped, take up the duties of his office on January 1, 1900, and the planning and erection of the new buildings will then proceed with as little delay as possible.

NOTES.

WE regret to learn that Prof. Bunsen, the veteran chemist, is lying seriously ill at his residence in Heidelberg, and that little hope is entertained of his recovery.

M. DE FONVIELLE, writing from Paris, says: "M. Janssen has left Paris for his usual annual journey to the Observatory on the summit of Mont Blanc, to inspect the instruments installed there.—The Minister of Finance granted to MM. Hermite, at Besançon, the sum of fifty pounds for their experiments with free balloons. It is intended to send up a balloon with new recording apparatus during the forthcoming meeting of the French Association at Boulogne."

MR. BALFOUR has consented to take the chair at a festival dinner at the end of November in aid of the fund now being raised to provide new laboratories at King's College, London.

THE autumn meeting of the Iron and Steel Institute was opened at Manchester on Tuesday, under the presidency of Sir William Roberts-Austen, K.C.B., F.R.S.

THE Superintendent of the U.S. Coast and Geodetic Survey has designated Dr. Frank Schlesinger, Columbia University, New York City, to take charge of the variation of latitude observations at Ukiah, California, in accordance with the plans of the International Geodetic Association.

IT is with great regret that we learn of the death of Dr. Daniel G. Brinton, the distinguished and erudite American anthropologist, in his sixty-third year. Although Dr. Brinton was for many years Professor of American Archæology and Linguistics in the University of Pennsylvania, we understand that he had very little actual teaching to do, and thus was at liberty to devote himself to research. Dr. Brinton was known as an enthusiastic student of linguistics, and had a profound knowledge of American languages. He had recently bequeathed his extensive and very valuable linguistic library to his University The following are some of his contributions to anthropological science: "The Floridean Peninsula: its Indian Tribes and Antiquities"; "The Myths of the New World" (third edition, 1896); "The Religious Sentiment: a Contribution to the Science of Religion"; "American Hero Myths"; "The Chronicles of the Mayas"; "The Annals of the Cakchiquels"; "Ancient Nahuatl Poetry"; "Races and Peoples"; "Lectures on Ethnography"; "Essays of an Americanist"; "The American Race"; "The Pursuit of Happiness"; "Nagualism"; "Grammar of the Choctaw Language"; "Grammar of the Cakchiquel Language," and various other papers and memoirs.

A HURRICANE of unusual severity struck the island of Montserrat, West Indies, on the 7th inst., and caused great devastation there and at other points of its path. It is reported to have reached Porto Rico on the 8th, to have been central over the north-east of Cuba on the 10th, and to have reached the southern part of Florida on the 12th. As pointed out in our note of July 20 last (p. 281), West India hurricanes are most prevalent at this season of the year; the average number between August and November is two a month, but the tracks are often over the open sea, and do not come in contact with the numerous islands. The course taken by the storm in question was more to the northward of the hurricane which caused so much damage at Barbados and St. Vincent last September, and has taken a somewhat more westerly route than the average path. The rate at which it travelled seems to have been under ten miles an hour, which is about the usual velocity in those latitudes; but this has no relation to the force of wind in the whirl of the storm, which probably reached a rate of 100 miles an hour at times. By a telegram from New York on the 12th, the fury of the storm appeared to have abated, probably owing to contact with the land; but for further particulars as to its behaviour, we must wait for the official reports of the Governors of the various islands and of the United States authorities.

PROF. E. VAN AUBEL, assistant professor of physics in the University of Ghent, sends us an interesting note with reference to Dr. C. G. Knott's recent experiments on magnetic strain in bismuth (p. 192) and Mr. Shelford Bidwell's comment upon them (p. 222). It appears that, in 1892, Prof. van Aubel prepared a paper on the same subject, entitled "Influence de l'aimantation sur la longueur d'un barreau de bismuth," and it was published in the *Journal de physique théorique et appliquée* (troisième serie, tome i. p. 424, 1892). His experiments were made with perfectly pure bismuth, prepared by electrolysis, and used by Prof. A. Classen for the determination of the atomic weight of the metal. An interference method was employed to determine any change of length, but no change was found. Prof. van Aubel expresses his satisfaction that the results of his investigation have now been confirmed by Mr. Shelford Bidwell's new experiments.

THE value of towing experiments upon small-scale models of ships for the purpose of deducing the resistance of a full-sized ship from that of the model was first demonstrated by the late Mr. William Froude, whose son, Mr. R. E. Froude, F.R.S., is the superintendent of experiments of this kind at the Admiralty Experimental Works, Gosport. The Construction Bureau of the United States Navy Department has appreciated for many years the value of an experimental basin, but it was unable to secure a grant for the purpose until about two years ago, when Congress granted 100,000 dols. for this work. The basin proper was finished towards the close of last year, and the special machinery and apparatus have now just been completed and installed, after a good deal of delay, due indirectly to the war with Spain. The basin is situated in the Washington Navy Yard, but the building is 500 feet long and about 50 feet wide inside. The water surface of the basin is slightly shorter than the building, being about 470 feet long. The deep portion is about 370 feet long, the south end, from which runs begin, being shallow. The water surface is 43 feet wide, and the depth from top of coping to the bottom of the basin is 14 feet 8 inches. The basin is thus larger than any other in existence, and it is well equipped with machinery for the performance of experiments. Electricity is used to drive the overhead carriage which tows the models; in fact, it is used for all mechanical work in connection with the model tank. Experiments are now being made to determine frictional coefficients of varnished surfaces and other constants needed in the use of the basin. Experiments are also being made as opportunity serves upon models of the naval vessels already built and tried for the purpose of accumulating data which will be constantly needed during the life of the tank.

AN important paper has been recently communicated to the Swedish Academy of Sciences by Dr. Hildebrandsson, Director of Upsala Observatory, entitled "Researches on the centres of action of the atmosphere: II. Rainfall." In a previous paper, published in 1897, it was shown that an intimate relation exists between the variations of barometric pressure in different regions of the earth, *e.g.* if the pressure of the air is above or below the mean at the Azores, the reverse condition would obtain between Iceland and Scotland; and similarly for other parts of the world. Rainfall is perhaps the most important element in the economy of nations, but it is apparently the most variable and irregular of all when dealt with for short periods, but for seasons, or longer periods, considerable regularity is observed. The paper contains tables and curves showing seasonal and yearly values of rainfall for a number of places; and from these it is seen, for instance, that as regards Iceland and the Azores the variations in the rainfall during the cold season are almost always in the opposite direction, and equally clear results are shown to exist for other localities. It is evident that a prediction of rainfall six months in advance would be of great utility in India. With regard to those regions, the author finds that the amount of rainfall between October and March in Siberia is generally in inverse proportion to the amount which will fall in India during the following rainy season. It is not pretended that any definite laws have been determined, but the provisional results seem to be of sufficient importance to warrant a more detailed inquiry.

MR. W. E. HOYLE, Director of the Manchester Museum, Owens College, has presented a very satisfactory report upon the progress made during 1898. The museum is not merely a popular resort, but also an institution which works in many

ways for the advancement of science. The most important gift to the museum during last year was a collection of birds which formed the basis of Mr. H. E. Dresser's work on "The Birds of Europe," and his monographs of the Rollers and of the Bee-eaters. Neither trouble nor expense was spared to make the collection as complete as possible, and more particularly to make it a working collection. As regards the extent of the collection, there are of Bee-eaters about 30 species and 155 specimens, and of Rollers 26 species with 112 specimens; whilst the Western Palæarctic collection contains 721 and the Eastern 260, making a total of 1037 species, or more, according to the British Museum Catalogue. In almost every instance these forms are represented not merely by a single skin but by several, showing the differences of plumage due to sex, age, and local variation, the collection amounting in total to some 10,000 specimens. There are several types and numerous rarities, among which may be mentioned two specimens of the Rosy Gull, whose nesting-place was discovered by Nansen in Franz Josef Land, and two Labrador Falcons. Mr. Hoyle rightly points out that the acquisition of this valuable collection is a piece of singular good fortune for the Manchester Museum, and therefore for all students of ornithology in the neighbourhood.

SOME interesting experiments on the corrosion of metals by sea water have (says *Engineering*) been carried out at Kiel during the past two years. The plan followed was to cut off twelve specimens of the metal to be tested, of which three were kept as "witnesses," whilst the other nine were placed in salt water. At the end of eight months three of the latter were withdrawn and compared with the "witnesses." Eight months later a second set were withdrawn and a fresh comparison made, those then left being taken out after the lapse of a third period of eight months. The metals tested included alloys of copper rich in zinc, bronzes containing little zinc, bronzes containing no zinc, pure aluminium bronzes, and finally bronzes containing aluminium and zinc or zinc and iron. The latter in particular showed remarkable resistance to the corrosive powers of sea water, being practically untouched at the end of a two years' immersion. The alloys containing zinc, however, gave much less favourable results. The copper-tin alloys and copper-aluminium alloys and the iron bronzes resisted perfectly when immersed in sea water in contact with iron. The bronzes containing iron, when placed in contact with those of tin, showed a loss by corrosion. It is thus important, if corrosion is to be prevented, to avoid placing these alloys in contact with metals electro-positive to them.

AN account of the application of liquefied carbonic acid gas to extinguish underground fires was given by Mr. George Spencer at the recent meeting of the Institution of Mining Engineers. At a colliery with which Mr. Spencer was connected a fire occurred in a heading, as the result of a fall of roof and sides on steam-pipes. The heading was built off with as little delay as possible, but notwithstanding all efforts to shut out the air, sufficient reached the seat of fire to keep it burning slowly. It was therefore decided to apply carbon dioxide, and for this purpose six cylinders of liquefied gas were successfully used. It is not claimed that the method described can be successfully applied to all gob-fires, but there are undoubtedly many cases which might be so treated. In case of fire on shipboard the use of carbon dioxide would no doubt prove invaluable, as it could be quickly applied, and would not cause the same damage to cargoes as water.

THE numbers of the *Kew Bulletin* just issued (Nos. 144–146) contain several articles and items of information which serve to show the influence which Kew exerts on botanical science and plant industries in many parts of the world. The life-history of a parasitic fungus which for the past two years has destroyed a considerable number of examples of the beautiful flowering shrub *Prunus japonica*, Thumb., growing in Kew Gardens, is described by Mr. G. Massee, and preventive measures of dealing with it are given. An account is given of experiments made in Queensland for the improvement of the sugar-cane by chemical selection upon a method proposed by Sir William Thiselton-Dyer. The object of the experiments was to ascertain the possibility of increasing the average richness and purity of the juice of a given variety of sugar-cane, by chemical analysis of the juice from each of the "seed canes"—that is, canes from which the plants were to be taken—and by the selection of those plants from the seed canes which were found by the analysis to yield the richest and purest juice. The results of the experiments show clearly that canes planted from rich seed canes selected in this way yielded a juice of higher sucrose content and lower glucose content than canes planted from those shown chemically to be of a "low" grade.

THREE new analyses of moldavite glass are published by Dr. C. v. John in the *Verhandlungen der k.k. geolog. Reichsanstalt*, Nos. 6 and 7, 1899. The specimens were handed over by Dr. F. E. Suess for investigation, and with them a specimen of glass from Netin in Moravia, received from Prof. Dvorský, of Brünn. This glass fragment, considered by Drs. Dvorský and Suess to be of artificial origin, was analysed in order that its chemical composition might be compared with that of true moldavite. Similar fragments of artificial glass have been frequently mistaken for moldavite, but differ from the latter in the absence of the characteristic surface sculpture, as also by the different shade of colour. The three specimens of moldavite showed a strikingly similar chemical composition, in which the potash was considerably in excess of the soda. The glass fragment from Netin showed a very different composition, and proved to be a potash glass in which the percentage of potash was abnormally high. The percentage of silica, potash, and soda in moldavite from Budweis was 82·62, 2·28, and 0·63 respectively, while the artificial glass yielded silica 52·32, potash 22·84, and soda 0·24 per cent. The author appends a table containing all the analyses of moldavite known to him, and draws attention to the similarity of composition shown. He remarks that the iron occurs for the most part as ferrous oxide, and that ferric iron is found in larger quantities only in those varieties having a strong brown colour. The belief is expressed that in moldavite the potash is always in excess of the soda, and the author states that in all cases the sum of the alkalis contained is found to be very similar.

IN the same number of the *Verhandlungen* is published a paper by A. Rosiwal, in which some additional results of his technical investigation of building-stones are described. In this paper the author clearly explains his new method whereby the relative "freshness" and "degree of weathering" of various building-stones may be expressed in figures. This ingenious method consists in the application of simple formulæ, and it is clearly illustrated by numerous examples.

DR. DAVISON'S report on the Hereford earthquake of 1896 contains a brief note, by Mr. E. Greenly, on the relation between the intensity of the shock and the geological structure of the Bangor-Anglesey district. In a paper recently published in the *Transactions* of the Edinburgh Geological Society, Mr. Greenly gives the evidence at greater length. He shows that the shock was felt most powerfully in houses standing upon Carboniferous and Ordovician rocks, less so in those upon the hard volcanic series of Bangor, and least of all in the Schistose Complex of Anglesey; the general result being that "the shock

was felt inversely to the degree of elasticity of the rocks." It was, moreover, stronger in the neighbourhood of large boundary faults, where effects due to reflexion would tend to be well-marked. Mr. Greenly also makes the interesting suggestion that, in their passage to the Bangor-Anglesey district, the earth-waves must be influenced by their having to traverse the older palæozoic rocks of the Snowdonian synclinal fold.

DESPITE the important influence of modern theories of oscillatory discharges on our knowledge of the phenomena of lightning, but few attempts seem to have been made to present in a readable and concise form recently observed facts, both theoretical and experimental, bearing on the important question of lightning protection. The Weather Bureau of the United States Department of Agriculture has done good service in publishing, in the form of an illustrated pamphlet of seventy-four pages, a bulletin on "Lightning and the Electricity of the Air," prepared under the direction of Mr. Willis L. Moore. The first part, by Mr. Alexander G. McAdie, is occupied chiefly with theoretical considerations, and includes descriptions of various forms of kites used for modern repetitions of Franklin's experiment, investigations of the potential of the air made on the Washington Monument and elsewhere, notes on auroral displays, photographs of lightning flashes, and a full summary of the best forms of lightning conductors, of general directions for the erection of rods, of precautions to be observed in thunderstorms, and of the treatment of patients struck by lightning. A brief account of the principles of lightning arresters and the use of choke coils for alternating current-circuits concludes this part.

PART II. of the bulletin referred to above, by Mr. Alfred J. Henry, deals with statistics of loss of life and property by lightning, both in the United States and in Europe. It calls attention to the danger to live stock caused by wire fences, the effects of the soil, the kind of trees usually struck (under which head the susceptibility of oaks is prominently shown) and the question as to whether the danger of lightning stroke is increasing or decreasing. In the last question a distinction is made between "cold" strokes and those which cause fire, and it would appear that in Bavaria the total number of strokes is on the increase, but the percentage of fire-causing strokes is on the decrease. This section is illustrated by photographs showing the effects of lightning on different trees, and a map showing the relative frequency of thunderstorms in different parts of the United States.

WE have recently received from Messrs. Williams and Norgate the annual number of *Mittheilungen der Naturforschenden Gesellschaft in Bern* for 1897. In it M. L. Crelier contributes a paper on the Bessel's function of the second kind $S_n(x)$, in which are deduced a number of formulæ involving Bessel's functions, which the author claims to be new. An account of the exhumation of the late Jacob Steiner is also given, accompanied by measurements of the great mathematician's skull.

PROF. AUGUSTO RIGHI contributes to the *Rendiconti* of the Bologna Academy a paper on the absorption of light on the part of a gas placed in a magnetic field. This forms a continuation of Prof. Righi's investigations on the Zeeman effect. The new experiments, conducted with the aid of a large Rowland's grating, deal chiefly with the inverse of Zeeman's phenomena, both with hypoazotid and with polarised light in sodium vapour. The investigation has an important bearing on results previously obtained by Macaluso and Corbino.

M. E. H. AMAGAT, writing in the *Journal de Physique* for July, proposes a new form of the relation $f(p, v, T)=0$ for fluids. From considerations, partly theoretical and partly experimental, M. Amagat is led to adopt the formula

$$\left\{p+\frac{v-[a+m(v-b)+c/(v-b)]T}{kvr-a+n\sqrt{[(v-\beta)^2+d^2]}}\right\}v=RT,$$

a formula which, in the case of carbonic acid, agrees closely with observations of the pressures corresponding to given volumes and temperatures, both in the gaseous state and along the curve of saturation.

A NEW classification of the Tineæ of Central Europe is given by Dr. Arnold Spuler in the *Sitzungsberichte der physikalisch-medicinischen Societät* (Erlangen) for 1898. Dr. Spuler follows modern views in placing the large Cossidæ among the Tineæ next before the family Tortricoidæ.

WE have just received two new parts of the *Bulletin* of the New York State Museum (vol. vi. Nos. 26 and 27, April and May 1899). Both are by Dr. Ephraim Porter Felt, State Entomologist. The first relates to the collection, preservation, and distribution of New York insects, and contains illustrations of apparatus. The second concerns shade-tree pests, and relates to various Coleoptera, Lepidoptera, Hymenoptera, and Hemiptera. It is illustrated, though it is but a small pamphlet, with five admirable plates, besides figures in the text.

THE volume containing the numbers of the *Bulletin of Miscellaneous Information* issued by the Royal Gardens, Kew, during 1898, has just been published. Many of the articles in this most serviceable publication have already been referred to in these columns, and we need now only call attention to the issue of them in a form convenient for reference. Particular attention is given in the volume to the cultivation of rubber plants, artificial indigo, China grass, and other subjects of economic importance.

THE seventh Robert Boyle Lecture on the "Physiological Perception of Musical Tone." delivered before the Oxford University Scientific Club on June 6. by Prof. J. G. McKendrick F.R S , has been published in pamphlet form by Mr. Henry Frowde. An abstract of the lecture appeared in NATURE of June 15.

THE publication of a series of "Studien und Skizzen aus Naturwissenschaft und Philosophie," by Dr. Adolf Wagner, has been commenced by the firm of the Gebrüder Borntraeger, Berlin. The first volume is an essay "Über wissenschaftliches Denken und über populäre Wissenschaft," which should be read by persons who instruct the scientific laity by spoken or written words; and the second volume is concerned with the "Problem der Willensfreiheit." A number of other volumes are in preparation.

A DESCRIPTIVE catalogue of the Tunicata in the Australian Museum, Sydney, N.S.W., prepared by Prof. W. A. Herdman, F.R.S., has been published by order of the Trustees of the Museum. The collection upon which the catalogue is based was sent to Prof. Herdman several years ago, but certain circumstances prevented the publication of the work in 1893, when it was ready for press. The work is not put forward as a monograph on Australian Tunicata, so the only anatomical and histological details included are those required for the description of the various species. A list of the Tunicata Fauna of Australian seas, so far as it is at present known, is given, and also a brief general account of the structure and life-history of a typical Ascidian, which may be of service to students referring to the catalogue. Numerous plates illustrate the various species described.

THE additions to the Zoological Society's Gardens during the past week include a Pinche Monkey (*Midas aedipus*) from

Colombia, presented by Mr. R. E. Stone; two Common Duikers (*Cephalophus grimmi*), six Swainson's Francolins (*Pternistes swainsoni*) from South Africa, presented by Mr. J. E. Matcham; a Suricate (*Suricata tetradactyla*) from South Africa, a Common Hamster (Albino) (*Cricetus frumentarius*), European; an Antillean Boa (*Boa diviniloque*) from the West Indies, deposited; two Spotted Turtle Doves (*Turtur suratensis*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

HOLMES' COMET 1899 *d* (1892 III.).

Ephemeris for 12h. Greenwich Mean Time.

1899.	R.A.	Decl.	Br.	
			r^{-2}	$(r\Delta)^{-2}$
	h. m. s.	° ′ ″		
August 17	2 51 17·17	+36 29 53·4		
18	52 16·44	36 45 24·3		
19	53 14 43	37 0 51·8		
20	54 11·12	37 16 15·8	0·1905	0·04889
21	55 6·48	37 31 36·3		
22	56 0·47	37 46 53 2		
23	56 53·06	38 2 6·3		
24	2 57 44 22	+38 17 15·7	0·1888	0·04999

MOTION OF APSE LINE OF α GEMINORUM.—In a previous communication to the *Mem. Soc. Degli Spett. Ital.* (vol. xxvi., 1897), M. A. Belopolsky has drawn attention to the rapid motion of the line of apsides in the system of α Geminorum (Castor), and now, in the last issue of the same journal (vol. xxviii. pp. 103–108, 1899), he gives the results of more recent work on this interesting double star. The former measures were obtained from a series of spectrographs obtained at Pulkowa during one year, and were not sufficiently representative to give certain results. He has now at his disposal observations which he has made during the past three years, and in the present paper confines himself to the examination of three groups of these observations, reserving the discussion of the whole for a later article. These groups of observations embrace the periods: (1) 1896, March 8 to April 26; (2) 1898, March 15 to May 2; (3) 1899, January 19 to April 16. In the calculation several difficulties are found, the chief of which are the rapid movement (period 2·93 days), the uncertainty of a few thousandths of the period producing an error of several degrees in the true anomaly, and also the uncertainty of the time of passage through *Periastron*.

Tables are given showing comparisons between the calculated and observed values for the velocity in the line of sight, for all the dates in the three groups of observations, from which the author concludes that the probable error is only about ± 0·368 l.g. (± 0·92 miles). He finally concludes that the observed rapid movement of the line of apsides is real, and that the *period of this revolution* is

4 years 40 days = 2100 days.

He attributes the cause of this to the probable flattening of the components, and mentions that a flattening of one-seventh would be sufficient, if the dimensions of the system are equal to those of Algol, to produce the observed motion.

MR. TEBBUTT'S OBSERVATORY.—In presenting his report of the work done at his observatory at Windsor, New South Wales, during the year 1898, Mr. John Tebbutt states that the past year was remarkable for the large number of clear nights during the autumn, winter and spring months, rendering it possible to get a large amount of work done.

Meridian work was carried out with a 3-inch Cooke transit, the timekeeper being a Poole 8-day chronometer.

Extra-meridian work consisted of observations of occultations, planets, and comets. With the 8-inch equatorial thirty-six disappearances at the moon's dark limb were measured and the results published. The same instrument, in conjunction with the Grubb filar micrometer, was employed on fifty-seven nights in planetary observation; 73 comparisons of Vesta, 211 of Iris, 107 of Isis, 91 of Jupiter and η Virginis, 132 of Uranus and ω^1 Scorpii, and 132 of Uranus and ω^2 Scorpii, were recorded; and comparisons with the measures published by other observers have proved to be very satisfactory.

The observations of comets have been made with both the 4½-inch and 8-inch equatorials, and have included measures of Encke's Comet, and Comet Coddington-Pauly, the latter being followed from June 15 to March 3, 764 measures of the comet and 138 of comparison stars being made on 103 nights during that period.

Attempts to observe Comets Perrine, *e* and *h*, 1898, were unsuccessful owing to their proximity to the sun.

All the observations, computations and reductions have been made by the proprietor of the observatory it being extremely difficult to obtain even occasional assistance.

TEMPERATURES IN GASEOUS NEBULÆ.—Mr. F. E. Nipher, in a paper read before the Academy of Science, St Louis (vol. ix., No. 4), discussed the conditions of temperature, &c., in a gravitating nebula having *uniform temperature* throughout its mass. In a second paper he now discusses the same subject on the different assumption that the initial temperature *diminishes* from the centre outwards. After a lengthy mathematical discussion he derives a general formula

$$T = T_0(1+n)\left(\frac{r_0}{r}\right)^{1-n}$$

which reduces to Ritter's equation if the temperature of the mass be assumed initially uniform. He concludes that in general the temperature throughout a nebula is to be given in terms of the coordinates of the point in space where the temperature is to be determined, and the *ratio of contraction* from any given initial condition. If the temperature remains constant throughout the mass, then Ritter's equation would hold during contraction. If on account of unequal permeability to heat the temperature should become unequal, the law of temperature change as a function of the ratio of contraction becomes more complex, so that if at any time the temperature varies inversely as the *n*th power of the distance from the centre, the ratio of temperature change at any contracting surface will be given by the above equation, in which it is evident, from physical conditions, that *n* cannot be less than zero.

THE RECENT PERSEID METEORIC SHOWER.

A SERIES of very clear nights enabled the Perseids to be well observed this year. The shower was not of unusual brilliancy, but it furnished a considerable number of meteors, and they appear to have been widely observed. The occurrence of the Perseid display now excites not only the attention of the meteoric enthusiast, but is seriously observed by astronomers generally, and the application of photography to work of this kind has greatly stimulated the interest in it.

On August 9 the writer watched the north-eastern sky between about 10h. 15m. and 13h., but a few clouds prevailed during the first hour. 38 meteors were seen, of which 26 were Perseids. On August 10, between about 10h. and 13h. 30m., 91 meteors were seen, of which 72 were Perseids. On August 11, between 10h and 13h. 30m., 90 meteors were observed, including 68 Perseids. On August 12, between 10h. and 13h. 30m., 62 meteors were counted, and amongst these were 43 Perseids. On August 13, 23 meteors (10 Perseids) were seen in 2 hours, and on August 14, 29 meteors (12 Perseids) were recorded in 2¼ hours.

On August 10, between 11h. 10m. and 14h. 35m., Prof. A. S. Herschel at Slough observed 104 meteors, and after making allowance for time spent in registering the paths the horary number of meteors for one observer would be about 40. He describes the maximum as having been observed between 12h. and 12h. 30m., when several bright meteors succeeded each other at short intervals.

On August 10 Mr. T. H. Astbury, observing at Shifnal, Salop, says that thirty-four meteors were seen between 10h. and 11h., the great majority being Perseids. There was also an active radiant in Cygnus.

On August 11 only about eighteen meteors were seen from 10h. till 11h., so that he concluded the maximum occurred on the 10th, when the meteors were brighter and more numerous.

According to the Bristol observations already alluded to, very little decline in numbers was, however, noticed on August 11, and to exhibit this more readily, the following table has been compiled :—